



11283-013001.ST25.txt
SEQUENCE LISTING

<110> Kuramitsu, Seiki
Yokoyama, Shigeyuki

<120> Novel DNA Repair Enzymes, Nucleic Acids Encoding DNA Repair
Enzymes And Methods of Using Them

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<140> US 09/938,901

<141> 2001-08-24

<150> JP 47762/2001

<151> 2001-02-23

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<170> PatentIn version 3.3

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tcc	gag	gtc	ctt	ctg	cag	cag	acc	cgg	gtg	gag	cag	gcc	ctc	ccc	tat	144
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Tyr	Arg	Arg	Phe	Leu	Glu	Arg	Phe	Pro	Thr	Leu	Lys	Ala	Leu	Ala	Ala	
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Ala	Ser	Leu	Glu	Glu	Val	Leu	Arg	Val	Trp	Gln	Gly	Ala	Gly	Tyr	Tyr	
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cgg	cgg	gcg	gaa	cac	ctc	cac	cgc	ctg	gcc	cga	agc	gtg	gag	gag	ctt	288
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ccc	ccg	agc	ttc	gcc	gag	ctt	cgg	ggg	ctt	cct	ggt	ctc	ggg	cct	tac	336
Pro	Pro	Ser	Phe	Ala	Glu	Leu	Arg	Gly	Leu	Pro	Gly	Leu	Gly	Pro	Tyr	
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Pro Pro Ser Phe Ala Glu Leu Arg Gly Leu Pro Gly Leu Gly Pro Tyr
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145 150 155 160

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Gly Ala Phe Cys Arg Gly Lys Glu Ala Pro Gly Arg Tyr Pro Ala Pro
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Arg Lys Arg Arg Ala Lys Glu Glu Arg Leu Val Ala Leu Val Leu Leu
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Gly Glu Gly Glu Asp Pro Trp Lys Arg Pro Leu Pro Lys Leu Met Glu
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 Leu Ala Tyr Trp His Arg Gly Phe Arg Arg Lys Glu Asp Leu Asp Pro
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 Tyr Asp Ala Asp Gly Leu Thr Gly Thr Ala Ile Leu Val Arg Gly Leu
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 Ala Ala Leu Gly Ala Asp Val His Pro Phe Ile Pro His Arg Leu Glu
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 Page 4

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Tyr Asp Ala Asp Gly Leu Thr Gly Thr Ala Ile Leu Val Arg Gly Leu
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 325 330 335
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 355 360 365
 Val Arg Ser Leu Ala Pro Ile Ser Ala Val Glu Ala Leu Arg Ser Ala
 370 375 380
 Glu Asp Leu Leu Leu Arg Tyr Gly Gly His Lys Glu Ala Ala Gly Phe
 385 390 395 400
 Ala Met Asp Glu Ala Leu Phe Pro Ala Phe Lys Ala Arg Val Glu Ala
 405 410 415
 Tyr Ala Ala Arg Phe Pro Asp Pro Val Arg Glu Val Ala Leu Leu Asp
 420 425 430
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 Phe Gly Ala Pro Glu Glu Ala Arg Arg Leu Gly Glu Gly Arg His Leu
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 Ala Trp Asn Gly His Leu Ala Tyr Glu Val Gln Ala Val Asp Leu Arg
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 Lys Pro Glu Ala Leu Glu Gly Gly Ile Ala Pro Phe Ala Tyr Pro Leu
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 Val Pro Glu Asp Asn Pro Glu Gly Leu Asp Tyr Ala Arg Lys Ala Gly
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 Pro Arg Pro Val Leu Gly Arg Arg Val Glu Val Ala Leu Gly Arg Glu
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11283-013001.ST25.txt

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cac His	cgg Arg	ttc Phe	gcc Ala 260	agc Ser	cgc Arg	ggg Gly	gag Glu	gcc Ala 265	aag Lys	acc Thr	ctg Leu	gcc Ala 270	ctg Leu	gcc Ala	ctg Leu	816
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Leu	Glu	His	Arg	Leu 85	Gly	Pro	Gly	Gly	Arg 90	Glu	Val	Leu	Leu	Asn 95	Gly

Lys Arg Val Ser Leu Arg Thr Leu Trp Glu Leu Pro Gly Ser Val Leu
 100 105 110
 Val Ser Pro Leu Asp Leu Glu Ala Val Leu Gly Pro Lys Glu Glu Arg
 115 120 125
 Arg Ala Tyr Leu Asp Arg Leu Ile Ala Arg Phe Ser Arg Arg Tyr Ala
 130 135 140
 Ala Leu Leu Ser Ala Tyr Glu Lys Ala Leu Arg Gln Arg Asn Ala Leu
 145 150 155 160
 Leu Lys Ala Gly Gly Glu Gly Leu Ser Ala Trp Asp Arg Glu Leu Ala
 165 170 175
 Arg Tyr Gly Asp Glu Ile Val Ala Leu Arg Arg Arg Phe Leu Arg Arg
 180 185 190
 Phe Ala Pro Ile Leu Arg Glu Val His Ala Ala Leu Ala Ala Lys Glu
 195 200 205
 Ala Gly Leu Arg Leu Glu Glu Thr Ala Gly Glu Gly Val Leu Arg Ala
 210 215 220
 Leu Glu Ala Ser Arg Ala Glu Glu Arg Glu Arg Gly Gln Thr Leu Val
 225 230 235 240
 Gly Pro His Arg Asp Asp Leu Val Phe Leu Leu Glu Gly Arg Pro Ala
 245 250 255
 His Arg Phe Ala Ser Arg Gly Glu Ala Lys Thr Leu Ala Leu Ala Leu
 260 265 270
 Arg Leu Ala Glu His Arg Leu Leu Gly Glu His His Gly Glu Pro Pro
 275 280 285
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 290 295 300
 Arg Ala Val Leu Ala Tyr Ala Gln Ala Leu Pro Gln Ala Ile Leu Ala
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 <212> DNA
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<220>
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 Gln Val Gly Ala Ala Leu Leu Phe Ala Gln Glu Ala Pro Pro Ala Leu
 20 25 30
 ctc ctc gtc ccc gag gcg cgg ctt agg cgc tac cgg gac ctc tcc gcc 144
 Leu Leu Val Pro Glu Ala Arg Leu Arg Arg Tyr Arg Asp Leu Ser Ala
 35 40 45
 ttc ggg gcc aag gtc tac gtg aac ccc ggc ctc gag gcc ctg gag gaa 192
 Phe Gly Ala Lys Val Tyr Val Asn Pro Gly Leu Glu Ala Leu Glu Glu
 50 55 60
 aaa gcc ctc ttc gtc ctc tcc tac gag gag gcc cta agc ccc ttc ccc 240
 Lys Ala Leu Phe Val Leu Ser Tyr Glu Glu Ala Leu Ser Pro Phe Pro
 65 70 75 80
 gag gac cct gag gcc tgg cgg ctt ctt ctg gag gtg ggc cgc gcc tac 288
 Glu Asp Pro Glu Ala Trp Arg Leu Leu Leu Glu Val Gly Arg Ala Tyr
 85 90 95
 ccc cgg gag gcc ctc ctc tcc cgc ctc ctc aag ctg ggc tac gcc cgg 336
 Pro Arg Glu Ala Leu Leu Ser Arg Leu Leu Lys Leu Gly Tyr Ala Arg
 100 105 110
 gac gag gac tac cgc gtc ctg ggg gag gtg gtg gag ctc ggc gag gtg 384
 Asp Glu Asp Tyr Arg Val Leu Gly Glu Val Val Glu Leu Gly Glu Val
 115 120 125
 cgc ctg gag ttc ttc ggg gac gag ctg gaa agg ctt gtg gtc cgg ggg 432
 Arg Leu Glu Phe Phe Gly Asp Glu Leu Glu Arg Arg Leu Val Val Arg Gly
 130 135 140
 gag gaa agg cgg cgc cac gtc ctt ctg ccc aag ccg ggg aag gcg gag 480
 Glu Glu Arg Arg Arg His Val Leu Leu Pro Lys Pro Gly Lys Ala Glu
 145 150 155 160
 ggc ttc acc tcc aag aag gtc ctc cac ttc cct ggc ccc gtc tac ctg 528
 Gly Phe Thr Ser Lys Lys Val Leu His Phe Pro Gly Pro Val Tyr Leu
 165 170 175
 gac acc ccc gcc ctc gcc ccc aag gcc ctt tgg ccc ctc ctc gcg gga 576
 Asp Thr Pro Ala Leu Ala Pro Lys Ala Leu Trp Pro Leu Ala Gly
 180 185 190
 agg ccc tgg gtg gcc ctg ggc ggc ggg gtg gag ctc ccc ccc ttg gag 624
 Arg Pro Trp Val Ala Leu Gly Gly Gly Val Glu Leu Pro Pro Leu Glu
 195 200 205

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gaa Glu 225	aag Lys	gac Asp	ctc Leu	gcc Ala	cgc Arg 230	tgg Trp	ctt Leu	gcc Ala	gag Glu	ggg Gly 235	aag Lys	cgg Arg	gtc Val	cac His	ctc Leu 240	720
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aac Asn	ctc Leu	gtc Val 675	ccc Pro	gag Glu	gcc Ala	cgc Arg	atc Ile 680	ggg Gly	gtg Val	gtc Val	cac His	ggc Gly 685	cag Gln	atg Met	ccc Pro	2064
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acc Thr	ttg Leu	tac Tyr	cag Gln 740	ctc Leu	cgg Arg	ggc Gly	cgg Arg	gtg Val 745	ggg Gly	cgg Arg	agg Arg	gag Glu	gag Glu 750	gag Glu	gcc Ala	2256
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ctt Leu 945	acg Thr	cag Gln	tac Tyr	ccg Pro	ccc Pro 950	ggg Gly	ttc Phe	cgc Arg	ctg Leu	gag Glu 955	aag Lys	aag Lys	ggc Gly	ctg Leu	agg Arg 960	2880

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gac ctc 2934
 Asp Leu

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 <212> PRT
 <213> Thermus thermophilus

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 35 40 45

Phe Gly Ala Lys Val Tyr Val Asn Pro Gly Leu Glu Ala Leu Glu Glu
 50 55 60

Lys Ala Leu Phe Val Leu Ser Tyr Glu Glu Ala Leu Ser Pro Phe Pro
 65 70 75 80

Glu Asp Pro Glu Ala Trp Arg Leu Leu Leu Glu Val Gly Arg Ala Tyr
 85 90 95

Pro Arg Glu Ala Leu Leu Ser Arg Leu Leu Lys Leu Gly Tyr Ala Arg
 100 105 110

Asp Glu Asp Tyr Arg Val Leu Gly Glu Val Val Glu Leu Gly Glu Val
 115 120 125

Arg Leu Glu Phe Phe Gly Asp Glu Leu Glu Arg Leu Val Val Arg Gly
 130 135 140

Glu Glu Arg Arg Arg His Val Leu Leu Pro Lys Pro Gly Lys Ala Glu
 145 150 155 160

Gly Phe Thr Ser Lys Lys Val Leu His Phe Pro Gly Pro Val Tyr Leu
 165 170 175

Asp Thr Pro Ala Leu Ala Pro Lys Ala Leu Trp Pro Leu Leu Ala Gly
 180 185 190

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Arg Pro Trp Val Ala Leu Gly Gly Gly Val Glu Leu Pro Pro Leu Glu
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Leu Gly Ala Arg Pro Leu Pro Pro Tyr Arg Gly Ser Leu Lys Ala Leu
210 215 220

Glu Lys Asp Leu Ala Arg Trp Leu Ala Glu Gly Lys Arg Val His Leu
225 230 235 240

Phe Val Gly His Ala Arg Thr Leu Glu Tyr Leu Lys Arg Arg Leu Gln
245 250 255

Ala Phe Ser Pro Leu Ile Leu Asp Arg Phe Pro Gly Pro Lys Gly Arg
260 265 270

Leu Ala Leu Leu Pro Gly Asp Phe Glu Gly Gly Ala Glu Trp Gly Glu
275 280 285

Trp Val Leu Leu Thr Glu Ala Leu Val Phe Ala Thr Gly Gly Val Arg
290 295 300

Ala Arg Val Arg Val Gly Glu Gly Leu Ser Asp Pro Gly Ala Leu Ser
305 310 315 320

Pro Gly Asp Tyr Leu Ile His Pro Glu His Gly Val Gly Gln Tyr Leu
325 330 335

Gly Leu Glu Thr Arg Glu Val Leu Gly Val Lys Arg Asp Tyr Leu Val
340 345 350

Leu Arg Tyr Lys Gly Glu Gly Lys Leu Tyr Leu Pro Val Glu Gln Leu
355 360 365

Pro Leu Leu Lys Arg His Pro Gly Thr Thr Asp Asp Pro Pro Glu Leu
370 375 380

Ser Ser Leu Gly Lys Asn Glu Trp Gln Arg Ala Lys Glu Arg Ala Arg
385 390 395 400

Lys Asp Val Glu Glu Leu Ala Gly Arg Leu Leu Val Leu Gln Ala Lys
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Arg Lys Ala Thr Pro Gly Arg Ala Phe Pro Pro Leu Pro Glu Trp Asp
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Pro Leu Val Glu Lys Gly Phe Pro Tyr Glu Leu Thr Pro Asp Gln Lys
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Arg Ala Leu Glu Glu Val Leu Arg Asp Leu Glu Ser Pro His Pro Met
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465 470 475 480

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485 490 495

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500 505 510

Glu Arg Phe Gln Gly Leu Pro Val Arg Val Ala Val Leu Ser Arg Phe
515 520 525

Thr Pro Pro Lys Glu Glu Glu Ala Ile Leu Lys Gly Leu Ala Glu Gly
530 535 540

Thr Val Asp Ile Val Ile Gly Thr His Arg Leu Leu Gln Glu Asp Val
545 550 555 560

Arg Phe Arg Asp Leu Gly Leu Leu Ile Val Asp Glu Glu His Arg Phe
565 570 575

Gly Val Ala Gln Lys Glu Arg Ile Arg Glu Leu Lys Ala Glu Val Asp
580 585 590

Thr Leu Tyr Leu Ser Ala Thr Pro Ile Pro Arg Thr Leu Tyr Ser Ala
595 600 605

Leu Val Gly Leu Lys Asp Leu Ser Ser Ile Gln Thr Pro Pro Pro Gly
610 615 620

Arg Lys Pro Ile Lys Thr Phe Leu Ala Pro Phe Asp Pro Leu Leu Val
625 630 635 640

Arg Glu Ala Ile Leu Phe Glu Leu Glu Arg Gly Gly Lys Val Phe Tyr
645 650 655

Val His Asp Arg Val Ala Ser Ile Glu Ala Arg Arg Arg Phe Leu Glu
660 665 670

Asn Leu Val Pro Glu Ala Arg Ile Gly Val Val His Gly Gln Met Pro
675 680 685

Glu Ser Leu Ile Glu Glu Thr Met Leu Leu Phe Ala Glu Gly Ala Tyr
Page 19

690

695

Asp Val Leu Leu Ala Thr Thr Ile Ile Glu Ala Gly Leu Asp Val Pro
705 710 715 720

Glu Ala Asn Thr Ile Leu Ile Glu Arg Ala Asp Arg Leu Gly Leu Ala
725 730 735

Thr Leu Tyr Gln Leu Arg Gly Arg Val Gly Arg Arg Glu Glu Glu Ala
740 745 750

Tyr Ala Tyr Leu Phe His Pro Pro Arg Leu Thr Glu Ala Ala Glu Lys
755 760 765

Arg Leu Ala Ala Ile Ala Asp Leu Ser Asp Leu Gly Ser Gly His Leu
770 775 780

Leu Ala Glu Arg Asp Met Glu Ile Arg Gly Val Gly Asn Leu Leu Gly
785 790 795 800

Pro Glu Gln His Gly His Ile Arg Ala Leu Ser Leu Glu Val Tyr Thr
805 810 815

Glu Leu Leu Glu Glu Ala Ile Arg Lys Leu Lys Gly Glu Ala Lys Glu
820 825 830

Glu Arg Arg His Val Thr Leu Asp Leu Ala Leu Ser Ala Arg Leu Pro
835 840 845

Ala Glu Tyr Val Gly Ser Leu Glu Ala Arg Ser Arg Tyr Tyr Ser Arg
850 855 860

Phe Ala Glu Ala Lys Ser Leu Ala Glu Leu Ser Arg Leu Val Arg Glu
865 870 875 880

Leu Lys Glu Arg Tyr Gly Pro Leu Pro Glu Glu Ala Glu Asn Phe Val
885 890 895

Ala Leu Ala Arg Leu Arg Leu Val Ala Glu Arg Lys Gly Val Val Ser
900 905 910

Ile Thr Glu Gly Leu Thr His Leu Glu Val Val Phe Pro Arg Tyr Pro
915 920 925

Leu Asp Tyr Asp Ala Arg Gly Leu Lys Gly Leu Pro Tyr Arg Val Glu
930 935 940

Leu Thr Gln Tyr Pro Pro Gly Phe Arg Leu Glu Lys Lys Gly Leu Arg
 945 950 955 960

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Asp Leu

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<220>
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31

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<210> 14

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35 40 45

Trp Arg Arg Arg Ala Glu Asp Glu Met Asp Leu Asp Arg Arg Ala Tyr
50 55 60

Ala Val Trp Val Ser Glu Val Met Leu Gln Gln Thr Gln Val Ala Thr
65 70 75 80

Val Ile Asn Tyr Tyr Thr Gly Trp Met Gln Lys Trp Pro Thr Leu Gln
85 90 95

Asp Leu Ala Ser Ala Ser Leu Glu Glu Val Asn Gln Leu Trp Ala Gly
100 105 110

Leu Gly Tyr Tyr Ser Arg Gly Arg Arg Leu Gln Glu Gly Ala Arg Lys
115 120 125

Val Val Glu Glu Leu Gly Gly His Met Pro Arg Thr Ala Glu Thr Leu
 130 135 140

Gln Gln Leu Leu Pro Gly Val Gly Arg Tyr Thr Ala Gly Ala Ile Ala
 145 150 155 160

Ser Ile Ala Phe Gly Gln Ala Thr Gly Val Val Asp Gly Asn Val Ala
 165 170 175

Arg Val Leu Cys Arg Val Arg Ala Ile Gly Ala Asp Pro Ser Ser Thr
 180 185 190

Leu Val Ser Gln Gln Leu Trp Gly Leu Ala Gln Gln Leu Val Asp Pro
 195 200 205

Ala Arg Pro Gly Asp Phe Asn Gln Ala Ala Met Glu Leu Gly Ala Thr
 210 215 220

Val Cys Thr Pro Gln Arg Pro Leu Cys Ser Gln Cys Pro Val Glu Ser
 225 230 235 240

Leu Cys Arg Ala Arg Gln Arg Val Glu Gln Glu Gln Leu Leu Ala Ser
 245 250 255

Gly Ser Leu Ser Gly Ser Pro Asp Val Glu Glu Cys Ala Pro Asn Thr
 260 265 270

Gly Gln Cys His Leu Cys Leu Pro Pro Ser Glu Pro Trp Asp Gln Thr
 275 280 285

Leu Gly Val Val Asn Phe Pro Arg Lys Ala Ser Arg Lys Pro Pro Arg
 290 295 300

Glu Glu Ser Ser Ala Thr Cys Val Leu Glu Gln Pro Gly Ala Leu Gly
 305 310 315 320

Ala Gln Ile Leu Leu Val Gln Arg Pro Asn Ser Gly Leu Leu Ala Gly
 325 330 335

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 340 345 350

Arg Lys Ala Leu Leu Gln Glu Leu Gln Arg Trp Ala Gly Pro Leu Pro
 355 360 365

Ala Thr His Leu Arg His Leu Gly Glu Val Val His Thr Phe Ser His
 370 375 380

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Ile Lys Leu Thr Tyr Gln Val Tyr Gly Leu Ala Leu Glu Gly Gln Thr
385 390 395 400

Pro Val Thr Thr Val Pro Pro Gly Ala Arg Trp Leu Thr Gln Glu Glu
405 410 415

Phe His Thr Ala Ala Val Ser Thr Ala Met Lys Lys Val Phe Arg Val
420 425 430

Tyr Gln Gly Gln Gln Pro Gly Thr Cys Met Gly Ser Lys Arg Ser Gln
435 440 445

Val Ser Ser Pro Cys Ser Arg Lys Lys Pro Arg Met Gly Gln Gln Val
450 455 460

Leu Asp Asn Phe Phe Arg Ser His Ile Ser Thr Asp Ala His Ser Leu
465 470 475 480

Asn Ser Ala Ala Gln
485

<210> 21

<211> 461

<212> PRT

<213> Schizosaccharomyces pombe

<400> 21

Met Ser Asp Ser Asn His Phe Leu Asp Leu His Ser Tyr Thr Gln Leu
1 5 10 15

Glu Val Glu Arg Phe Arg Glu Ser Leu Ile Gln Phe Tyr Asp Lys Thr
20 25 30

Lys Arg Ile Leu Pro Trp Arg Lys Lys Glu Cys Ile Pro Pro Ser Glu
35 40 45

Asp Ser Pro Leu Glu Asp Trp Glu Gln Pro Val Gln Arg Leu Tyr Glu
50 55 60

Val Leu Val Ser Glu Ile Met Leu Gln Gln Thr Arg Val Glu Thr Val
65 70 75 80

Lys Arg Tyr Tyr Thr Lys Trp Met Glu Thr Leu Pro Thr Leu Lys Ser
85 90 95

Cys Ala Glu Ala Glu Tyr Asn Thr Gln Val Met Pro Leu Trp Ser Gly
100 105 110

Met Gly Phe Tyr Thr Arg Cys Lys Arg Leu His Gln Ala Cys Gln His
 115 120 125
 Leu Ala Lys Leu His Pro Ser Glu Ile Pro Arg Thr Gly Asp Glu Trp
 130 135 140
 Ala Lys Gly Ile Pro Gly Val Gly Pro Tyr Thr Ala Gly Ala Val Leu
 145 150 155 160
 Ser Ile Ala Trp Lys Gln Pro Thr Gly Ile Val Asp Gly Asn Val Ile
 165 170 175
 Arg Val Leu Ser Arg Ala Leu Ala Ile His Ser Asp Cys Ser Lys Gly
 180 185 190
 Lys Ala Asn Ala Leu Ile Trp Lys Leu Ala Asn Glu Leu Val Asp Pro
 195 200 205
 Val Arg Pro Gly Asp Glu Asn Gln Ala Leu Met Glu Leu Gly Ala Ile
 210 215 220
 Thr Cys Thr Pro Gln Ser Pro Arg Cys Ser Val Cys Pro Ile Ser Glu
 225 230 235 240
 Ile Cys Lys Ala Tyr Gln Glu Gln Asn Val Ile Arg Asp Gly Asn Thr
 245 250 255
 Ile Lys Tyr Asp Ile Glu Asp Val Pro Cys Asn Ile Cys Ile Thr Asp
 260 265 270
 Ile Pro Ser Lys Glu Asp Leu Gln Asn Trp Val Val Ala Arg Tyr Pro
 275 280 285
 Val His Pro Ala Lys Thr Lys Gln Arg Glu Glu Arg Ala Leu Val Val
 290 295 300
 Ile Phe Gln Lys Thr Asp Pro Ser Thr Lys Glu Lys Phe Phe Leu Ile
 305 310 315 320
 Arg Lys Arg Pro Ser Ala Gly Leu Leu Ala Gly Leu Trp Asp Phe Pro
 325 330 335
 Thr Ile Glu Phe Gly Gln Glu Ser Trp Pro Lys Asp Met Asp Ala Glu
 340 345 350
 Phe Gln Lys Ser Ile Ala Gln Trp Ile Ser Asn Asp Ser Arg Ser Leu
 355 360 365

Ile Lys Lys Tyr Gln Ser Arg Gly Arg Tyr Leu His Ile Phe Ser His
 370 375 380

Ile Arg Lys Thr Ser His Val Phe Tyr Ala Ile Ala Ser Pro Asp Ile
 385 390 395 400

Val Thr Asn Glu Asp Phe Phe Trp Ile Ser Gln Ser Asp Leu Glu His
 405 410 415

Val Gly Met Cys Glu Leu Gly Leu Lys Asn Tyr Arg Ala Ala Leu Glu
 420 425 430

Ile Lys Lys Arg Lys Val Thr Ser Leu Ser Asn Phe Lys Glu Pro Lys
 435 440 445

Leu Thr Ser Ala Arg Arg Ile Val Thr Lys Ala Glu Cys
 450 455 460

<210> 22
 <211> 350
 <212> PRT
 <213> Escherichia coli

<400> 22

Met Gln Ala Ser Gln Phe Ser Ala Gln Val Leu Asp Trp Tyr Asp Lys
 1 5 10 15

Tyr Gly Arg Lys Thr Leu Pro Trp Gln Ile Asp Lys Thr Pro Tyr Lys
 20 25 30

Val Trp Leu Ser Glu Val Met Leu Gln Gln Thr Gln Val Ala Thr Val
 35 40 45

Ile Pro Tyr Phe Glu Arg Phe Met Ala Arg Phe Pro Thr Val Thr Asp
 50 55 60

Leu Ala Asn Ala Pro Leu Asp Glu Val Leu His Leu Trp Thr Gly Leu
 65 70 75 80

Gly Tyr Tyr Ala Arg Ala Arg Asn Leu His Lys Ala Ala Gln Gln Val
 85 90 95

Ala Thr Leu His Gly Gly Lys Phe Pro Glu Thr Phe Glu Glu Val Ala
 100 105 110

Ala Leu Pro Gly Val Gly Arg Ser Thr Ala Gly Ala Ile Leu Ser Leu
 115 120 125

Ser Leu Gly Lys His Phe Pro Ile Leu Asp Gly Asn Val Lys Arg Val
 130 135 140
 Leu Ala Arg Cys Tyr Ala Val Ser Gly Trp Pro Gly Lys Lys Glu Val
 145 150 155 160
 Glu Asn Lys Leu Trp Ser Leu Ser Glu Gln Val Thr Pro Ala Val Gly
 165 170 175
 Val Glu Arg Phe Asn Gln Ala Met Met Asp Leu Gly Ala Met Ile Cys
 180 185 190
 Thr Arg Ser Lys Pro Lys Cys Ser Leu Cys Pro Leu Gln Asn Gly Cys
 195 200 205
 Ile Ala Ala Ala Asn Asn Ser Trp Ala Leu Tyr Pro Gly Lys Lys Pro
 210 215 220
 Lys Gln Thr Leu Pro Glu Arg Thr Gly Tyr Phe Leu Leu Leu Gln His
 225 230 235 240
 Glu Asp Glu Val Leu Leu Ala Gln Arg Pro Pro Ser Gly Leu Trp Gly
 245 250 255
 Gly Leu Tyr Cys Phe Pro Gln Phe Ala Asp Glu Glu Ser Leu Arg Gln
 260 265 270
 Trp Leu Ala Gln Arg Gln Ile Ala Ala Asp Asn Leu Thr Gln Leu Thr
 275 280 285
 Ala Phe Arg His Thr Phe Ser His Phe His Leu Asp Ile Val Pro Met
 290 295 300
 Trp Leu Pro Val Ser Ser Phe Thr Gly Cys Met Asp Glu Gly Asn Ala
 305 310 315 320
 Leu Trp Tyr Asn Leu Ala Gln Pro Pro Ser Val Gly Leu Ala Ala Pro
 325 330 335
 Val Glu Arg Leu Leu Gln Gln Leu Arg Thr Gly Ala Pro Val
 340 345 350

<210> 23
 <211> 211
 <212> PRT
 <213> Escherichia coli

<400> 23

Met Asn Lys Ala Lys Arg Leu Glu Ile Leu Thr Arg Leu Arg Glu Asn
 1 5 10 15

Asn Pro His Pro Thr Thr Glu Leu Asn Phe Ser Ser Pro Phe Glu Leu
 20 25 30

Leu Ile Ala Val Leu Leu Ser Ala Gln Ala Thr Asp Val Ser Val Asn
 35 40 45

Lys Ala Thr Ala Lys Leu Tyr Pro Val Ala Asn Thr Pro Ala Ala Met
 50 55 60

Leu Glu Leu Gly Val Glu Gly Val Lys Thr Tyr Ile Lys Thr Ile Gly
 65 70 75 80

Leu Tyr Asn Ser Lys Ala Glu Asn Ile Ile Lys Thr Cys Arg Ile Leu
 85 90 95

Leu Glu Gln His Asn Gly Glu Val Pro Glu Asp Arg Ala Ala Leu Glu
 100 105 110

Ala Leu Pro Gly Val Gly Arg Lys Thr Ala Asn Val Val Leu Asn Thr
 115 120 125

Ala Phe Gly Trp Pro Thr Ile Ala Val Asp Thr His Ile Phe Arg Val
 130 135 140

Cys Asn Arg Thr Gln Phe Ala Pro Gly Lys Asn Val Glu Gln Val Glu
 145 150 155 160

Glu Lys Leu Leu Lys Val Val Pro Ala Glu Phe Lys Val Asp Cys His
 165 170 175

His Trp Leu Ile Leu His Gly Arg Tyr Thr Cys Ile Ala Arg Lys Pro
 180 185 190

Arg Cys Gly Ser Cys Ile Ile Glu Asp Leu Cys Glu Tyr Lys Glu Lys
 195 200 205

Val Asp Ile
 210

<210> 24

<211> 28

<212> PRT

<213> Thermus thermophilus

<400> 24

Lys Arg Ile Arg Val His Gly Asp Tyr Asp Ala Asp Gly Leu Thr Gly
 1 5 10 15

Thr Ala Ile Leu Val Arg Gly Leu Ala Ala Leu Gly
 20 25

<210> 25

<211> 28

<212> PRT

<213> escherichia coli

<400> 25

Thr Arg Ile Ile Val Val Gly Asp Phe Asp Ala Asp Gly Ala Thr Ser
 1 5 10 15

Thr Ala Leu Ser Val Leu Ala Met Arg Ser Leu Gly
 20 25

<210> 26

<211> 28

<212> PRT

<213> aquifex aeolicus

<400> 26

Lys Arg Ile Ile Ile Tyr Gly Asp Tyr Asp Val Asp Gly Ile Thr Gly
 1 5 10 15

Thr Ala Ile Leu Tyr Arg Val Leu Lys Leu Leu Gly
 20 25

<210> 27

<211> 28

<212> PRT

<213> helicobacter pylori

<400> 27

Thr Glu Ile Leu Val Val Gly Asp Tyr Asp Ala Asp Gly Val Ile Ser
 1 5 10 15

Ser Ala Ile Met Ala Lys Phe Phe Glu Ser Leu Asn
 20 25

<210> 28

<211> 28

<212> PRT

<213> Haemophilus influenzae

<400> 28

Gln Lys Ile Val Ile Val Gly Asp Phe Asp Ala Asp Gly Ala Thr Ser

1 5 10 15

Thr Ala Leu Ser Val Leu Ala Leu Arg Gln Leu Gly
20 25

<210> 29
<211> 28
<212> PRT
<213> saccharomyces cerevisiae

<400> 29

Thr Ile Cys Val Gly Asn Glu Ser Ala Asp Met Asp Ser Ile Ala Ser
1 5 10 15

Ala Ile Thr Tyr Ser Tyr Cys Gln Tyr Ile Tyr Asn
20 25

<210> 30
<211> 28
<212> PRT
<213> drosophila melanogaster

<400> 30

His Leu Val Met Gly Asn Glu Ser Cys Asp Leu Asp Ser Ala Val Ser
1 5 10 15

Ala Val Thr Leu Ala Phe Val Tyr Ala Ala Ser Ser
20 25

<210> 31
<211> 19
<212> PRT
<213> thermus thermophilus

<400> 31

Ser Asp Leu Phe Leu Thr Val Asp Cys Gly Ile Thr Asn His Ala Glu
1 5 10 15

Leu Arg Glu

<210> 32
<211> 19
<212> PRT
<213> escherichia coli

<400> 32

Ala Gln Leu Ile Val Thr Val Asp Asn Gly Ile Ser Ser His Ala Gly
1 5 10 15

Val Glu His

<210> 33
 <211> 19
 <212> PRT
 <213> aquifex aeolicus

<400> 33

Gly Asp Phe Leu Ile Thr Val Asp Asn Gly Thr Ser Ala Val Glu Glu
 1 5 10 15

Ile Asp Gln

<210> 34
 <211> 19
 <212> PRT
 <213> helicobacter pylori

<400> 34

Ala Pro Leu Ile Ile Thr Val Asp Asn Gly Ile Asn Ala Phe Glu Ala
 1 5 10 15

Ala Arg Phe

<210> 35
 <211> 19
 <212> PRT
 <213> haemophilus influenzae

<400> 35

Val Gln Leu Leu Met Thr Val Asp Asn Gly Val Ser Ser Phe Asp Gly
 1 5 10 15

Val Ala Phe

<210> 36
 <211> 19
 <212> PRT
 <213> saccharomyces cerevisiae

<400> 36

Glu Leu Asn Ser Tyr Leu Val Asp Asn Asn Asp Thr Pro Lys Asn Leu
 1 5 10 15

Lys Asn Tyr

<210> 37
 <211> 19
 <212> PRT
 <213> drosophila melanogaster

<400> 37

Pro Leu Val Cys Glu Met Trp Asp Cys Arg Ala Arg Val Ala Leu Pro
 1 5 10 15

Arg Arg Tyr

<210> 38
 <211> 13
 <212> PRT
 <213> thermus thermophilus

<400> 38

Val Glu Val Ile Val Thr Asp His His Thr Pro Gly Lys
 1 5 10

<210> 39
 <211> 13
 <212> PRT
 <213> escherichia coli

<400> 39

Ile Pro Val Ile Val Thr Asp His His Leu Pro Gly Asp
 1 5 10

<210> 40
 <211> 13
 <212> PRT
 <213> aquifex aeolicus

<400> 40

Leu Glu Thr Val Val Ile Asp His His Asn Val Pro Pro
 1 5 10

<210> 41
 <211> 13
 <212> PRT
 <213> helicobacter pylori

<400> 41

Tyr Thr Leu Ile Ile Thr Asp His His Cys Leu His His
 1 5 10

<210> 42
 <211> 13
 <212> PRT

<213> haemophilus influenzae

<400> 42

Ile Arg Val Leu Val Thr Asp His His Leu Pro Pro Glu
1 5 10

<210> 43

<211> 13

<212> PRT

<213> saccharomyces cerevisiae

<400> 43

Asn Val Val Gly Ile Ile Asp His His Phe Asp Leu Gln
1 5 10

<210> 44

<211> 13

<212> PRT

<213> drosophila melanogaster

<400> 44

Asn Val Ile Glu Ile Leu Asp His Arg Pro Leu Glu Asp
1 5 10

<210> 45

<211> 19

<212> PRT

<213> thermus thermophilus

<400> 45

Tyr Ala Asp Leu Ala Ala Val Gly Thr Ile Ala Asp Val Ala Pro Leu
1 5 10 15

Trp Gly Trp

<210> 46

<211> 19

<212> PRT

<213> escherichia coli

<400> 46

Leu Leu Asp Leu Val Ala Leu Gly Thr Val Ala Asp Val Val Pro Leu
1 5 10 15

Asp Ala Asn

<210> 47

<211> 19

<212> PRT

<213> aquifex aeolicus

<400> 47

Phe Leu Asp Leu Val Ala Leu Gly Leu Leu Ala Asp Tyr Met Pro Val
 1 5 10 15

Asn Pro Val

<210> 48

<211> 19

<212> PRT

<213> helicobacter pylori

<400> 48

Leu Leu Cys Leu Ala Gly Val Ala Thr Ile Ala Asp Met Met Pro Leu
 1 5 10 15

Thr Phe Phe

<210> 49

<211> 19

<212> PRT

<213> haemophilus influenzae

<400> 49

Leu Leu Asp Leu Val Ala Leu Gly Thr Ile Ala Asp Val Val Pro Leu
 1 5 10 15

Asp Gln Asn

<210> 50

<211> 19

<212> PRT

<213> saccharomyces cerevisiae

<400> 50

Ile Ala Leu Leu Leu Met Gly Ala Ile Leu Ile Asp Thr Ser Asn Met
 1 5 10 15

Arg Arg Lys

<210> 51

<211> 19

<212> PRT

<213> drosophila melanogaster

<400> 51

Val Ala Gln Leu Leu His Ala Thr Ile Val Leu Asp Thr Ile Asn Phe
1 5 10 15

Ala Pro Ala

<210> 52
<211> 17
<212> PRT
<213> thermus thermophilus

<400> 52

Asp Leu Leu Leu Arg Tyr Gly Gly His Lys Glu Ala Ala Gly Phe Ala
1 5 10 15

Met

<210> 53
<211> 17
<212> PRT
<213> escherichia coli

<400> 53

Gly Met Met Leu Lys Phe Gly Gly His Ala Met Ala Ala Gly Leu Ser
1 5 10 15

Leu

<210> 54
<211> 17
<212> PRT
<213> aquifex aeolicus

<400> 54

Asp Met Phe Leu Lys Trp Gly Gly His Asp Lys Ala Met Gly Leu Thr
1 5 10 15

Leu

<210> 55
<211> 17
<212> PRT
<213> helicobacter pylori

<400> 55

Ser Leu Leu Leu Gly Tyr Gly Gly His Arg Gln Ala Cys Gly Leu Ser
1 5 10 15

Val

<210> 56
 <211> 17
 <212> PRT
 <213> haemophilus influenzae

<400> 56

Asn Met Ile Leu Lys Phe Gly Gly His Ala Met Ala Ala Gly Leu Ser
 1 5 10 15

Ile

<210> 57
 <211> 49
 <212> DNA
 <213> Artificial sequence

<220>
 <223> Synthetic DNA

<400> 57
 actacttggt acactgacgc gagcacgcag gagctcattc cagtgcgca

49

<210> 58
 <211> 343
 <212> PRT
 <213> Thermus thermophilus

<400> 58

Met Arg Leu Leu Leu Phe Arg Gln Arg Asn Phe Arg Asn Leu Ala Leu
 1 5 10 15

Glu Ala Tyr Arg Pro Pro Pro Gly Leu Ser Ala Leu Val Gly Ala Asn
 20 25 30

Ala Gln Gly Lys Thr Ser Leu Leu Leu Gly Ile His Leu Ala Leu Gly
 35 40 45

Gly Glu Val Pro Leu Gly Leu Ala Asp Leu Val Arg Phe Gly Glu Glu
 50 55 60

Glu Ala Trp Leu His Ala Glu Val Glu Thr Glu Leu Gly Ala Tyr Arg
 65 70 75 80

Leu Glu His Arg Leu Gly Pro Gly Gly Arg Glu Val Leu Leu Asn Gly
 85 90 95

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Lys Arg Val Ser Leu Arg Thr Leu Trp Glu Leu Pro Gly Ser Val Leu
 100 105 110
 Val Ser Pro Leu Asp Leu Glu Ala Val Leu Gly Pro Lys Glu Glu Arg
 115 120 125
 Arg Ala Tyr Leu Asp Arg Leu Ile Ala His Phe Ser Arg Arg Tyr Ala
 130 135 140
 Ala Leu Leu Ser Ala Tyr Glu Lys Ala Leu Arg Gln Arg Asn Ala Leu
 145 150 155 160
 Leu Lys Ala Gly Gly Glu Gly Leu Ser Ala Trp Asp Arg Glu Leu Ala
 165 170 175
 Arg Tyr Gly Asp Glu Ile Val Ala Leu Arg Arg Arg Phe Leu Arg Arg
 180 185 190
 Phe Ala Pro Ile Leu Arg Glu Val His Ala Ala Leu Ala Ala Lys Glu
 195 200 205
 Ala Gly Leu Arg Leu Glu Glu Thr Ala Gly Glu Gly Val Leu Arg Ala
 210 215 220
 Leu Glu Ala Ser Arg Ala Glu Glu Arg Glu Arg Gly Gln Thr Leu Val
 225 230 235 240
 Gly Pro His Arg Asp Asp Leu Val Phe Leu Leu Glu Gly Arg Pro Ala
 245 250 255
 His Arg Phe Ala Ser Arg Gly Glu Ala Lys Thr Leu Ala Leu Ala Leu
 260 265 270
 Arg Leu Ala Glu His Arg Leu Leu Gly Glu His His Gly Glu Pro Pro
 275 280 285
 Leu Leu Leu Val Asp Glu Trp Gly Glu Glu Leu Asp Glu Ala Arg Arg
 290 295 300
 Arg Ala Val Leu Ala Tyr Ala Gln Ala Leu Pro Gln Ala Ile Leu Ala
 305 310 315 320
 Gly Leu Glu Ala Pro Pro Gly Val Pro Val Cys Ser Val Val Arg Gly
 325 330 335
 Val Val Leu Cys Pro Gly Ala
 340

<210> 59
 <211> 357
 <212> PRT
 <213> Escherichia coli

<400> 59

Met Ser Leu Thr Arg Leu Leu Ile Arg Asp Phe Arg Asn Ile Glu Thr
 1 5 10 15

Ala Asp Leu Ala Leu Ser Pro Gly Phe Asn Phe Leu Val Gly Ala Asn
 20 25 30

Gly Ser Gly Lys Thr Ser Val Leu Glu Ala Ile Tyr Thr Leu Gly His
 35 40 45

Gly Arg Ala Phe Arg Ser Leu Gln Ile Gly Arg Val Ile Arg His Glu
 50 55 60

Gln Glu Ala Phe Val Leu His Gly Arg Leu Gln Gly Glu Glu Arg Glu
 65 70 75 80

Thr Ala Ile Gly Leu Thr Lys Asp Lys Gln Gly Asp Ser Lys Val Arg
 85 90 95

Ile Asp Gly Thr Asp Gly His Lys Val Ala Glu Leu Ala His Leu Met
 100 105 110

Pro Met Gln Leu Ile Thr Pro Glu Gly Phe Thr Leu Leu Asn Gly Gly
 115 120 125

Pro Lys Tyr Arg Arg Ala Phe Leu Asp Trp Gly Cys Phe His Asn Glu
 130 135 140

Pro Gly Phe Phe Thr Ala Trp Ser Asn Leu Lys Arg Leu Leu Lys Gln
 145 150 155 160

Arg Asn Ala Ala Leu Arg Gln Val Thr Arg Tyr Glu Gln Leu Arg Pro
 165 170 175

Trp Asp Lys Glu Leu Ile Pro Leu Ala Glu Gln Ile Ser Thr Trp Arg
 180 185 190

Ala Glu Tyr Ser Ala Gly Ile Ala Ala Asp Met Ala Asp Thr Cys Lys
 195 200 205

Gln Phe Leu Pro Glu Phe Ser Leu Thr Phe Ser Phe Gln Arg Gly Trp
 210 215 220

Glu Lys Glu Thr Glu Tyr Ala Glu Val Leu Glu Arg Asn Phe Glu Arg
 225 230 235 240

Asp Arg Gln Leu Thr Tyr Thr Ala His Gly Pro His Lys Ala Asp Leu
 245 250 255

Arg Ile Arg Ala Asp Gly Ala Pro Val Glu Asp Thr Leu Ser Arg Gly
 260 265 270

Gln Leu Lys Leu Leu Met Cys Ala Leu Arg Leu Ala Gln Gly Glu Phe
 275 280 285

Leu Thr Arg Glu Ser Gly Arg Arg Cys Leu Tyr Leu Ile Asp Asp Phe
 290 295 300

Ala Ser Glu Leu Asp Asp Glu Arg Arg Gly Leu Leu Ala Ser Arg Leu
 305 310 315 320

Lys Ala Thr Gln Ser Gln Val Phe Val Ser Ala Ile Ser Ala Glu His
 325 330 335

Val Ile Asp Met Ser Asp Glu Asn Ser Lys Met Phe Thr Val Glu Lys
 340 345 350

Gly Lys Ile Thr Asp
 355

<210> 60
 <211> 233
 <212> PRT
 <213> Pseudomonas putida

<400> 60

Met Ser Leu Arg Arg Ile Met Val Thr Ala Val Arg Asn Leu His Pro
 1 5 10 15

Val Thr Leu Leu Pro Ser Pro Arg Ile Asn Ile Leu Tyr Gly Ala Asn
 20 25 30

Gly Ser Gly Lys Thr Ser Val Leu Glu Ala Val His Leu Leu Gly Leu
 35 40 45

Ala Arg Ser Phe Arg Ser Thr Arg Leu Asn Pro Val Ile Gln Tyr Glu
 50 55 60

Gln Ala Ala Cys Thr Val Phe Gly Glu Val Gln Leu Thr Glu Gly Gly
 65 70 75 80

Thr Ser Asn Leu Gly Val Ser Arg Glu Arg Gln Gly Glu Phe Thr Ile
85 90 95

Arg Ile Asp Ala Leu Lys Pro Val Phe Glu Arg Thr Leu Ser Glu Leu
100 105 110

Val Glu Leu Asp Gly Leu Thr Leu Ser Tyr Tyr Arg Gly Trp Asp Lys
115 120 125

Asp Arg Glu Leu Gln Glu Val Leu Ala Ser Ser Leu Leu Arg Asp Gln
130 135 140

Gln Met Gly His Thr Gln Ala Gly Pro Gln Arg Ala Asp Leu Arg Leu
145 150 155 160

Arg Leu Ala Gly Asn Asn Ala Ala Asp Ile Leu Ser Arg Gly Gln Gln
165 170 175

Lys Leu Val Val Cys Ala Leu Arg Ile Ala Gln Gly His Leu Val Ser
180 185 190

Gln Ala Arg Arg Gly His Cys Ile Tyr Leu Val Asp Asp Leu Pro Ser
195 200 205

Glu Leu Asp Asp Gln His Arg Arg Ala Leu Cys Arg Leu Leu Glu Glu
210 215 220

Leu Arg Cys Gln Cys Ser Ser Pro Val
225 230

<210> 61
<211> 370
<212> PRT
<213> Bacillus subtilis

<400> 61

Met Tyr Ile Gln Asn Leu Glu Leu Thr Ser Tyr Arg Asn Tyr Asp His
1 5 10 15

Ala Glu Leu Gln Phe Glu Asn Lys Val Asn Val Ile Ile Gly Glu Asn
20 25 30

Ala Gln Gly Lys Thr Asn Leu Met Glu Ala Ile Tyr Val Leu Ser Met
35 40 45

Ala Lys Ser His Arg Thr Ser Asn Asp Lys Glu Leu Ile Arg Trp Asp
50 55 60

Lys Asp Tyr Ala Lys Ile Glu Gly Arg Val Met Lys Gln Asn Gly Ala
65 70 75 80

Ile Pro Met Gln Leu Val Ile Ser Lys Lys Gly Lys Lys Gly Lys Val
85 90 95

Asn His Ile Glu Gln Gln Lys Leu Ser Gln Tyr Val Gly Ala Leu Asn
100 105 110

Thr Ile Met Phe Ala Pro Glu Asp Leu Asn Leu Val Lys Gly Ser Pro
115 120 125

Gln Val Arg Arg Arg Phe Leu Asp Met Glu Ile Gly Gln Val Ser Pro
130 135 140

Val Tyr Leu His Asp Leu Ser Leu Tyr Gln Lys Ile Leu Ser Gln Arg
145 150 155 160

Asn His Phe Leu Lys Gln Leu Gln Thr Arg Lys Gln Thr Asp Arg Thr
165 170 175

Met Leu Asp Val Leu Thr Asp Gln Leu Val Glu Val Ala Ala Lys Val
180 185 190

Val Val Lys Arg Leu Gln Phe Thr Ala Gln Leu Glu Lys Trp Ala Gln
195 200 205

Pro Ile His Ala Gly Ile Ser Arg Gly Leu Glu Glu Leu Thr Leu Lys
210 215 220

Tyr His Thr Ala Leu Asp Val Ser Asp Pro Leu Asp Leu Ser Lys Ile
225 230 235 240

Gly Asp Ser Tyr Gln Glu Ala Phe Ser Lys Leu Arg Glu Lys Glu Ile
245 250 255

Glu Arg Gly Val Thr Leu Ser Gly Pro His Arg Asp Asp Val Leu Phe
260 265 270

Tyr Val Asn Gly Arg Asp Val Gln Thr Tyr Gly Ser Gln Gly Gln Gln
275 280 285

Arg Thr Thr Ala Leu Ser Leu Lys Leu Ala Glu Ile Asp Leu Ile His
290 295 300

Glu Glu Ile Gly Glu Tyr Pro Ile Leu Leu Leu Asp Asp Val Leu Ser
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305 310 320

Glu Leu Asp Asp Tyr Arg Gln Ser His Leu Leu His Thr Ile Gln Gly
325 330 335

Arg Val Gln Thr Phe Val Thr Thr Thr Ser Val Asp Gly Ile Asp His
340 345 350

Glu Thr Leu Arg Gln Ala Gly Met Phe Arg Val Gln Asn Gly Ala Leu
355 360 365

Val Lys
370

<210> 62
<211> 385
<212> PRT
<213> Mycobacterium tuberculosis
<400> 62

Met Tyr Val Arg His Leu Gly Leu Arg Asp Phe Arg Ser Trp Ala Cys
1 5 10 15

Val Asp Leu Glu Leu His Pro Gly Arg Thr Val Phe Val Gly Pro Asn
20 25 30

Gly Tyr Gly Lys Thr Asn Leu Ile Glu Ala Leu Trp Tyr Ser Thr Thr
35 40 45

Leu Gly Ser His Arg Val Ser Ala Asp Leu Pro Leu Ile Arg Val Gly
50 55 60

Thr Asp Arg Ala Val Ile Ser Thr Ile Val Val Asn Asp Gly Arg Glu
65 70 75 80

Cys Ala Val Asp Leu Glu Ile Ala Thr Gly Arg Val Asn Lys Ala Arg
85 90 95

Leu Asn Arg Ser Ser Val Arg Ser Thr Arg Asp Val Val Gly Val Leu
100 105 110

Arg Ala Val Leu Phe Ala Pro Glu Asp Leu Gly Leu Val Arg Gly Asp
115 120 125

Pro Ala Asp Arg Arg Arg Tyr Leu Asp Asp Leu Ala Ile Val Arg Arg
130 135 140

Pro Ala Ile Ala Ala Val Arg Ala Glu Tyr Glu Arg Val Leu Arg Gln
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145						150						155						160
Arg	Thr	Ala	Leu	Leu 165	Lys	Ser	Val	Pro	Gly 170	Ala	Arg	Tyr	Arg	Gly 175	Asp			
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His	Gly	Ala 195	Glu	Leu	Val	Ala	Ala 200	Arg	Ile	Asp	Leu	Val 205	Asn	Gln	Leu			
Ala	Pro 210	Glu	Val	Lys	Lys	Ala 215	Tyr	Gln	Leu	Leu	Ala 220	Pro	Glu	Ser	Arg			
Ser 225	Ala	Ser	Ile	Gly	Tyr 230	Arg	Ala	Ser	Met	Asp 235	Val	Thr	Gly	Pro	Ser 240			
Glu	Gln	Ser	Asp	Ile 245	Asp	Arg	Gln	Leu	Leu 250	Ala	Ala	Arg	Leu	Leu 255	Ala			
Ala	Leu	Ala	Ala 260	Arg	Arg	Asp	Ala	Glu 265	Leu	Glu	Arg	Gly	Val 270	Cys	Leu			
Val	Gly	Pro 275	His	Arg	Asp	Asp	Leu 280	Ile	Leu	Arg	Leu	Gly 285	Asp	Gln	Pro			
Ala	Lys 290	Gly	Phe	Ala	Ser	His 295	Gly	Glu	Ala	Trp	Ser 300	Leu	Ala	Val	Ala			
Leu 305	Arg	Leu	Ala	Ala	Tyr 310	Gln	Leu	Leu	Arg	Val 315	Asp	Gly	Gly	Glu	Pro 320			
Val	Leu	Leu	Leu	Asp 325	Asp	Val	Phe	Ala	Glu 330	Leu	Asp	Val	Met	Arg 335	Arg			
Arg	Ala	Leu	Ala 340	Thr	Ala	Ala	Glu	Ser 345	Ala	Glu	Gln	Val	Leu 350	Val	Thr			
Ala	Ala	Val 355	Leu	Glu	Asp	Ile	Pro 360	Ala	Gly	Trp	Asp	Ala 365	Arg	Arg	Val			
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Pro 385																		

<210> 63

<211> 359

<212> PRT

<213> Deinococcus radiodurans

<400> 63

Met Gly Asp Val Arg Leu Ser Ala Leu Ser Thr Leu Asn Tyr Arg Asn
 1 5 10 15

Leu Ala Pro Gly Thr Leu Asn Phe Pro Glu Gly Val Thr Gly Ile Tyr
 20 25 30

Gly Glu Asn Gly Ala Gly Lys Thr Asn Leu Leu Glu Ala Ala Tyr Leu
 35 40 45

Ala Leu Thr Gly Gln Thr Asp Ala Pro Arg Ile Glu Gln Leu Ile Gln
 50 55 60

Ala Gly Glu Thr Glu Ala Tyr Val Arg Ala Asp Leu Gln Gln Gly Gly
 65 70 75 80

Ser Leu Ser Ile Gln Glu Val Gly Leu Gly Arg Gly Arg Arg Gln Leu
 85 90 95

Lys Val Asp Gly Val Arg Ala Arg Thr Gly Asp Leu Pro Arg Gly Gly
 100 105 110

Ala Val Trp Ile Arg Pro Glu Asp Ser Glu Leu Val Phe Gly Pro Pro
 115 120 125

Ser Gly Arg Arg Ala Tyr Leu Asp Ser Leu Leu Ser Arg Leu Ser Ala
 130 135 140

Arg Tyr Gly Glu Gln Leu Ser Arg Tyr Glu Arg Thr Val Ser Gln Arg
 145 150 155 160

Asn Ala Ala Leu Arg Gly Gly Glu Glu Trp Ala Met His Val Trp Asp
 165 170 175

Asp Val Leu Leu Lys Leu Gly Thr Glu Ile Met Leu Phe Arg Arg Arg
 180 185 190

Ala Leu Thr Arg Leu Asp Glu Leu Ala Arg Glu Ala Asn Ala Gln Leu
 195 200 205

Gly Ser Arg Lys Thr Leu Ala Leu Thr Leu Thr Glu Ser Thr Ser Pro
 210 215 220

Glu Thr Tyr Ala Ala Asp Leu Arg Gly Arg Arg Ala Glu Glu Leu Ala
 225 230 235 240

Arg Gly Ser Thr Val Thr Gly Pro His Arg Asp Asp Leu Leu Leu Thr
 245 250 255

Leu Gly Asp Phe Pro Ala Ser Asp Tyr Ala Ser Arg Gly Glu Gly Arg
 260 265 270

Thr Val Ala Leu Ala Leu Arg Arg Ala Glu Leu Glu Leu Leu Arg Glu
 275 280 285

Lys Phe Gly Glu Asp Pro Val Leu Leu Leu Asp Asp Phe Thr Ala Glu
 290 295 300

Leu Asp Pro His Arg Arg Gln Tyr Leu Leu Asp Leu Ala Ala Ser Val
 305 310 315 320

Pro Gln Ala Ile Val Thr Gly Thr Glu Leu Ala Pro Gly Ala Ala Leu
 325 330 335

Thr Leu Arg Ala Gln Ala Gly Arg Phe Thr Pro Val Ala Asp Glu Glu
 340 345 350

Met Gln Ala Glu Gly Thr Ala
 355

<210> 64

<211> 89

<212> PRT

<213> Artificial sequence

<220>

<223> UvrB-beta artificial fragment

<400> 64

Arg Asn Leu Val Val Glu Arg Gly Lys Pro Tyr Pro Arg Glu Val Leu
 1 5 10 15

Leu Glu Arg Leu Leu Glu Leu Gly Tyr Gln Arg Asn Asp Ile Asp Leu
 20 25 30

Ser Pro Gly Arg Phe Arg Ala Lys Gly Glu Val Leu Glu Ile Phe Pro
 35 40 45

Ala Tyr Glu Thr Glu Pro Ile Arg Val Glu Leu Phe Gly Asp Glu Val
 50 55 60

Glu Arg Ile Ser Gln Val His Pro Val Thr Gly Glu Arg Leu Arg Glu
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65

70

80

Leu Pro Gly Phe Val Leu Phe Pro Ala
85

<210> 65

<211> 87

<212> PRT

<213> Artificial sequence

<220>

<223> TRCF-beta artificial fragment

<400> 65

Trp Arg Leu Leu Leu Glu Val Gly Arg Ala Tyr Pro Arg Glu Ala Leu
1 5 10 15

Leu Ser Arg Leu Leu Lys Leu Gly Tyr Ala Arg Asp Glu Asp Tyr Arg
20 25 30

Val Leu Gly Glu Val Val Glu Leu Gly Glu Val Arg Leu Glu Phe Phe
35 40 45

Gly Asp Glu Leu Glu Arg Leu Val Val Arg Gly Glu Glu Arg Arg Arg
50 55 60

His Val Leu Leu Pro Lys Pro Gly Lys Ala Glu Gly Phe Thr Ser Lys
65 70 75 80

Lys Val Leu His Glu Pro Gly
85